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SECTION 41 22 23.20

UTILITY HOISTS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASME INTERNATIONAL (ASME)

ASME B30.11	(2010) Monorails and Underhung Cranes - Safety Standard for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings
ASME B30.16	(2012) Overhead Hoists (Underhung)
ASME HST-1	(2012) Performance Standard for Electric Chain Hoists
ASME HST-4	(1999; R 2010) Performance Standard for Overhead Electric Wire Rope Hoists

ASTM INTERNATIONAL (ASTM)

ASTM A1023/A1023M	(2009; E 2012) Standard Specification for Stranded Carbon Steel Wire Ropes for General Purposes
ASTM A275	(2008; R 2013) Standard Test Method for Magnetic Particle Examination of Steel Forgings
ASTM E543	(2013) Standard Practice for Agencies Performing Non-Destructive Testing

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA ESPG	(2009-2010) Electrical Standards and Product Guide (ESPG)
NEMA ICS 8	(2011) Crane and Hoist Controllers
NEMA MG 1	(2011; Errata 2012) Motors and Generators
NEMA MG 2	(2001; Rev 1 2007) Safety Standard for Construction and Guide for Selection, Installation and Use of Electric Motors and Generators

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2011; Errata 2 2012) National Electrical
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Code

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.179

Overhead and Gantry Cranes

UNDERWRITERS LABORATORIES (UL)

UL 1340

(2012) Stanard for Hoist Edition 2

1.2 SYSTEM DESCRIPTION

Provide commercially designed and manufactured hoist systems having electric powered and controlled hoists complete, tested and ready for operation. Hoist equipment, materials, installation, examination, inspection, and workmanship shall conform to the applicable requirements of NFPA 70, ASME B30.11, ASME B30.16, ASME HST-1, ASME HST-4, as modified and supplemented by this specification. Reference in these publications to the "authority having jurisdiction" means the "Contracting Officer."

1.2.1 Design Requirements

Submit shop drawings showing hoist capacity, principal dimensions, details of structural connections, and all component details. Include complete schematic wiring diagram with description of operation. Manufacturer's catalog data will suffice for items of standard manufacturer.

1.2.1.1 Trade Coordination

The Contractor is responsible for the coordination of his work with the work of all trades involved and as it relates to the building structure and hoist assemblies.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

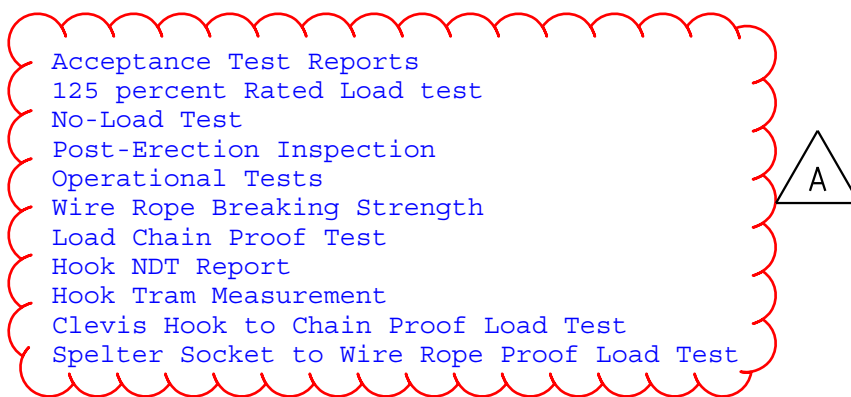
Hoists, including attachments to existing building structure and portable cart assemblies; G;
Complete schematic wiring diagram with description of operation; G

SD-03 Product Data

Electric Wire Rope Hoist; G
Electric Chain Hoist; G
Pendant Pushbutton Station; G
Schackles, hoist rings and support hardware building electrical power interface equipment.

Manufacturer's descriptive data and technical literature, performance charts and curves, catalog cuts, and installation instructions, and parts list. G

SD-06 Test Reports; G



SD-07 Certificates; G

Compliance with all listed Standards
 Overload/Safe for Testing
 Hazardous Material
 Brake Settings
 Loss of Power Test

SD-10 Operation and Maintenance Data

Hoist system, all components, Data Package 3; G

Submit Data Package 3 as specified in Section 01 78 23 OPERATION AND MAINTENANCE DATA.

1.4 QUALITY ASSURANCE

1.4.1 Certificates:

- a. Certification of minimum **Load Chain Proof Test**, clearly indicating load chain breaking strength for each hoist, and clearly identified for traceability. Submit factory certification of load chain rated capacity.
- a. Certification of minimum **wire rope breaking strength** for each hoist, with traceable identification for each hoist installed. Where applicable, submit factory certification of the wire rope rated capacity.
- b. Certification that the hoist system contains no **hazardous material**, asbestos, cadmium, lead, elemental mercury, or PCBs.
- c. **Overload/Safe for Testing** certification that the hoist system is safe to test on a semi-annual overload basis with a test load of 125 percent of rated capacity with no detrimental effects.
- d. Certification that testing may be performed in which hoist system is subjected to a **Loss of Power Test** during operation with no detrimental effects.
- e. Certification that the hoist system design and fabrication is in **compliance with all listed standards**.
- f. Certification of **brake settings**, including the allowable range of adjustment for hoist brakes and the initial setting of each.

1.4.2 Pre-Erection Inspection

Before erection, the Contractor shall inspect the hoist systems and components at the job site to determine compliance with specifications and manufacturer's data and shop drawings as approved. Notify the Contracting Officer 10 days before the inspection.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery and Storage

Inspect materials delivered to site for damage; unload and store with minimum handling. Store materials on-site in enclosures. Protect materials not suitable for outdoor storage to prevent damage or corrosion during periods of inclement weather, including subfreezing temperatures, precipitation, and high winds. Store materials susceptible to deterioration by direct sunlight under cover and avoid damage due to high temperatures. Do not store materials directly on ground. When special precautions are required, prominently and legibly stencil instructions for such precautions on outside of equipment or its crating.

1.5.2 Handling

Handle materials in such a manner as to ensure delivery to final location in undamaged condition. Make repairs to damaged materials at no cost to Government.

1.6 MAINTENANCE

Submit [Hoist system, all components, Data Package 3](#) for the entire system in accordance with Section [01 78 23](#) OPERATION AND MAINTENANCE DATA.

PART 2 PRODUCTS

2.1 IDENTIFICATION PLATES

Provide manufacturer installed identification plates of non-corrosive metal showing, in clearly legible permanent lettering, the manufacturer's name, model number, capacity rating [in pounds](#), and other essential information.

2.2 UTILITY HOIST SYSTEMS

Provide commercial [hoists](#) for special application described herein using electrical power and pushbutton control-type operations. The hoist shall meet the design requirements specified in [ASME HST-1](#), Duty Class H3 or [ASME HST-4](#), Duty Class H3.

2.2.1 Descriptin of Hoists

2.2.1.1 Drawbridge Hoists (Drawing 79K39267, S-694)

Type Hoist (3 Req'd)	Double Drum Floor Mounted
Capacity	6000 lbs; 3000 lbs single line pull each drum
Hook Speed	20 FPM
Drum Capacity	40 feet (each drum)
Drum Spacing	60 inches center to center at two(2) locations, level 16 and level 20 hoists

Drum Spacing	82 inches center to center at one(1) location, Level 25 hoist
Limit Switches	Geared upper and lower limits and secondary upper power limit switch
Cable conn. to drum	Clamp on swag type
Wire Rope	5/16 diameter, galvanized 6 x 37 IWRC per ASTM A1023/A1023M with galvanized open spelter socket
Controls	Push button single speed
Motor	6 HP @ 1200 RPM
Design Parameter	Chester Hoist Model WD-760 or equal

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2.2.1.2 Hinge Platform Hoist Cart (Drawing 79K39267, Sheet S-564)

Type Hoist (2 Req'd)	Worm Gear Winch
Capacity	4600 lbs.
Line Speed	9 FPM
Motor	2 HP 460/3/60 w/automatic brake
Drum	Mild steel frame and drum
Classification	Class 1 Division II Group C
Controls	Motor control with magnetic reversing starter, thermal overload relay and fused control circuit in a NEMA 4 enclosure

Pendant	15 ft. long push-button pendant
Wire Rope	3/8" dia. 6x37 IWRC galvanized with open spelter socket & swaged ball other end
Design Parameter	Therm Atlas II 3 WG4 Series or equal

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2.2.1.3 Accessory Adjustment Device Electric Chain Hoist (Drawings 79K39267, Sheet S-695, Note B)

Type Hoist (2 Req'd)	Electric Chain Hoist
Capacity	16,000 lb
Lift	13 feet
Duty Cycle	Dual speed - 30/10 min. w/VFD
Voltage	Hoist 460/3/60; Controls 110V
Class	ASME H4
Limit Switches	Upper and lower limits
Pendant	Dual speed-2 button (momentary contact)
Ratings	Hoist-NEMA 4, IP55 Pendant - IP65
Conformance	UL 1340
Safety	Friction clutch & load brake
Chain	Grade 80 super strength load chain
Design Parameter	Harrington (N) ER080SD
Hook	Forged alloy steel clevis sling hook with heavy duty safety latch

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2.2.2 Safety

Comply with the mandatory and advisory safety requirements of [ASME B30.11](#), [ASME B30.16](#), and [29 CFR 1910.179](#). The Contractor is responsible for checking the proper operation and condition of safety devices, electrical components, mechanical equipment, and structural assemblies prior to installation.

2.3 ELECTRIC WIRE ROPE HOIST

2.3.1 Hoisting Ropes

Hoisting ropes shall conform to **ASTM A1023/A1023M**, improved or extra improved plow steel, regular lay, uncoated, 6 by 37 class construction, with an independent wire rope core unless otherwise specified. Provide proof of wire rope breaking strength test report.

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2.3.2 Sheaves

Pitch diameter of sheaves shall not be less than 12 times the rope diameter. Contact surfaces of sheaves shall be unpainted.

2.3.3 Drum

Provide steel or ductile cast iron drum. Pitch diameter of the drum shall not be less than 18 times the rope diameter. A minimum of two dead wraps of the hoisting rope shall remain on each anchorage when the hook is in its extreme low position. Contact surfaces of drums shall be unpainted.

2.4 ELECTRIC CHAIN HOIST

Electric chain hoist shall conform to **ASME HST-1**, Class H3 and **NEMA ICS 8**, **NEMA MG 2**, and **NEMA ESPG** except as modified herein. Provide **clevis hook to chain proof load test** and **load chain proof test** results.

Provide chain hoists with **13 foot** lift or more with a load chain bucket.

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2.5 MOTORS

Motors shall conform to **NEMA MG 1**. All motors shall be minimum 60 minute duty rating. Motor insulation shall be Class H with a Class B temperature rise. Equip all motors with thermal trip type over-temperature protection.

2.6 CONTROLS

Provide control of electric hoist from a **pendant pushbutton station**. Arrange pushbuttons in accordance with **ASME B30.11** recommendations.

2.7 LIMIT SWITCHES

Equip hoists with adjustable upper and lower limit control power switches for wire rope or limit stops for chain hoist to prevent over-travel in both the raising and lowering directions. Provide secondary upper power limit switch.

2.8 BRAKES

2.8.1 Hoist Brake

Provide hoist brake that is capable of stopping and holding a 125 percent rated load minimum.

2.9 HOOK AND SPELTER SOCKETS

Spelter socket to wire rope proof load test shall be tested to 200% rated load and shall include end fitting assembly. Clevis sling hook and load

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chain assembly shall be proof load tested to 1 1/2 times rated load.

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2.9.1 Non-Destructive Testing

The following requirements apply:

- a. The [Hook NDT Report](#) supplier shall provide a letter certifying that the requirements of [ASTM E543](#) and [ASTM A275](#) are met.

2.10 BEARINGS

All bearings except those subject to a small rocker motion shall be anti-friction type. Provide a means for lubrication for bearings not considered to be lifetime lubricated by the manufacturer.

2.11 PAINTING SYSTEM

Provide manufacturer's standard painting or shop painting of the commercial hoist components.

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PART 3 EXECUTION

3.1 SITE TESTING

3.1.1 Test Procedures

The Contractor shall prepare and submit for approval, the test procedures for individual hoist systems described herein.

3.1.1.1 Individual Hoist Testing

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Upon receipt of individual hoist on site, a load test shall be performed to test 125% of the hoist rated load. Testing shall be performed using a dynamometer in the presence of the Contracting Officer's representative.

3.1.1.2 Hoist System Testing

Procedures shall be developed to verify the safety and operational performance of each hoist after complete installation and assembly of the permanent structural, mechanical and electrical HB-3 stations. Tests shall demonstrate the safe performance of each hoist system after installation in designated locations on the drawings.

The systems test shall be performed to test 125% of the hoist rated line pull from the drum. Testing shall be performed using a dynamometer in the presence of the Contracting Officer's representative.

- a. Draw Bridge Hoist - At each drawbridge place a dynamometer between the hook and the drawbridge and raise the drawbridge approximately 6 inches in order to determine the maximum hoist line pull needed to raise the drawbridge. Then add test weights to the drawbridge to achieve 125% line pull on the hoist. With 125% line pull raise the draw bridge approximately 6 inches, hold for three minutes lower the drawbridge remove the test weights.

Test the drawbridge hoist by raising the drawbridge through its full cycle demonstrating operation of drawbridge bridge hoist system. Repeat this test three times, demonstrate all limiting controls.

b. Electric Chain Hoist - The Electric Chain Hoist shall be tested to 125% of its rated capacity after installation. The test will include lifting the load 6 inches, hold for three minutes lower to the load. This test shall be performed on each hoist.

A 100% load test will follow where the hoist is operated through its full travel to demonstrate full operation of the hoist. The 100% test will be repeated three times.

c. Hinge Platform Hoist Cart - Test each hinged platform hoist cart as follows: At test platform location, place a dynamometer between the hook and one of the heaviest platform flips. Raise the platform flip approximately 6 inches in order to determine the maximum hoist line pull needed to raise the platform flip. Then add test weights to the end of the platform flip to achieve 125% line pull on the hoist. With 125% line pull raise the platform flip approximately 6 inches, hold for three minutes lower the platform flip and remove the test weights.

Test each platform flip as follows: Use one of the hinge platform hoist carts to raise and lower each platform flip (on all 10 north platform levels) throughout its full range of motion. Repeat this test using the other hinge platform hoist cart on all 10 south platform levels.

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3.2 FIELD QUALITY CONTROL

3.2.1 Post-Erection Inspection

After erection, the Contractor and the Contracting Officer, shall jointly inspect the hoist systems and components to determine compliance with specifications and approved submittals. Notify the Contracting Officer 10 days before the inspection. A list of deficient items, if required, including a determination of criticality will be provided to the Contractor for corrective action. Outstanding items shall be noted for correction during the inspection. Items considered critical (load bearing, load controlling, or operational safety devices) shall be corrected prior to further testing.

3.2.2 Operational Tests

- a. After erection and inspection, test the hoist as specified. Test the systems in service to determine that each component of the system operates as specified, is properly installed and adjusted, and is free from defects in material, manufacturing, installation, and workmanship.
- b. Furnish operating personnel, instruments, and all other necessary apparatus. The Contracting Officer will furnish to the Contractor test weights for testing. Receive and transport the loads from a location not more than 10 miles from the job site and return them to that location after the tests have been completed.

3.2.3 Test Data

Record test data and provide acceptance test reports on appropriate test record forms suitable for retention for the life of the hoist systems. Record operating and startup current measurements for electrical equipment (motors and coils) using appropriate instrumentation (i.e., clamp-on ammeters). Compare recorded values with design specifications or manufacturer's recommended values. Abnormal differences (i.e., greater than 10 percent from manufacturer's or design values) shall be justified or

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appropriate adjustments performed. In addition, note any high temperatures or abnormal operation of any equipment or machinery , investigate and correct. Record hoist speeds during each test cycle.

3.2.4 Hook Tram Measurement

Measure hook for hook throat spread before and after load test. Establish a throat dimension base measurement by installing two tram points and measuring the distance between these tram points (plus or minus 1/64 inch). Record this base dimension. Measure the distance between tram points before and after load test. An increase in the throat opening from the base measurement is cause for rejection.

3.2.5 No-Load Test

- a. Hoist: Raise the load hook the full operating lift distance and verify satisfactory operation of hoist, upper limit switches, lower limit switch, and the hoisting and lowering speeds.

3.2.6 125 percent Rated Load Test

125 Percent of rated capacity

- a. Hoist Static Test: Raise test load approximately one foot above the floor and hold for 10 minutes. Observe load lowering that may occur which indicates malfunction of hoisting component or brake. Lower the test load to the floor until the hoist line is slack.
- b. Loss of Power Test: Raise the test load approximately 3 feet and while lowering test load at low speed, cut main power to hoist. The load must stop.

-- End of Section --

